

Marked up version of all amended claims

[27] 1. Method and apparatus of a position encoder system for a computer, comprising:

- a housing movable in 2 directions relative to a reference base;
- encoding means for sensing movements of said housing relative to the reference base thereby providing indicative signals to a host computer directional and positional information of said housing;
- communication means for transferring signals from said encoding means to a host computer;
- modification means for changing the function the host computer performs base on the movements of said housing, including but not limited to changing the host computer to do nothing base on the movements of said housing.

[28] 2. The system in claim [27] 1 wherein said modification means being triggered will deactivate said encoding means preventing movements of said housing along said 2 directions to be sensed thereby said housing moves freely along said 2 directions without providing to a host computer indicative signals of directional and positional information of said housing;

[29] 3. The system in claim [27] 1 wherein said modification means being triggered will generate a further signal indicating to a host computer to interpret the movements of said housing differently, thereby the host computer performs different functions base on the movements of said housing.

[30] 4. The system in claim [27] 1 further comprising:

- said housing further including a plurality of keys being pressed thereby generating character signals to a host computer, said housing being moved by touching and/or pressing said plurality of keys with the fingers of an operator and applying a lateral force;
- sensing means detecting if said plurality of keys on said housing being touching by the fingers of an operator thereby providing indicative signals to a host computer tactile information of said plurality of keys;

- said plurality of keys on said housing being touched and/or pressed together with said housing being moved or let motionless, providing indicative signals to a host computer tactile information of said plurality of keys and positional and directional information of said housing, thereby directing a host computer to perform predetermined functions base on combinations of said plurality of keys being touched and/or pressed together with said housing being moving or not, allowing an operator to quickly direct a host computer to perform predetermined function by changing hand gestures of touching and/or pressing said plurality of keys and with or without applying a lateral force to move said housing;
- said combinations of said plurality of keys being touched and/or pressed together with said housing being moving or not, including but not limited to none of said first and second plurality of keys are pressed nor touched;
- said combinations of said plurality of keys being touched and/or pressed together with said housing being moving or not, being configurable by an operator through software or hardware means, thereby an operator being able to define combinations of said plurality of keys being touched and/or pressed together with said housing being moving or not, to indicate to a host computer to perform different operations;
- said predetermined functions performed by a host computer being configurable by an operator through software or hardware means;
- said predetermined functions performed by a host computer including but not limited to deactivating said encoding means thereby said housings being moved but not directing a host computer to perform any function;
- said modification means being defined as some of said combinations of said plurality of keys being touched and/or pressed together with said housing being moving or not.

[31] 5. The system in claim [30] 4 further comprising:

- said housing being a footprint adapted by a hand of an operator having one side with a first elongated indented area;
- a base being a keyboard case and a platform surface with a second elongated indented area;

- said communication means including a first communication member having one end received into said first housing through said first indented area and another end received into said supporting base through said second indented area thereby said first indented area facing said second indented forming a cavity allowing said first communication member to move thereon when said first housing moves over said platform surface;
- a link member being a tubular structure having a first end extended into said first indented area on said housing thereby said first end movable in a first direction along the length of said first indented area, said tubular structure having a second end extended into said second indented area on said platform surface thereby said second end movable in a second direction along the length of said second indented area, thereby said housing movable in said first and second directions coplanar to said platform surface, said first and second directions being orthogonal, said tubular structure being hollow thereby said communication means passing through therein from said housing into said base.

[32] 6. The system in claim [31] 5 further comprising:

- said keyboard case having a row of keys near the top edge representing the Esc, F1 to F12, Print Screen, Scroll Lock and Pause keys, said keyboard case having on the right side a numeric key pad representing the numeric key pad keys in a standard personal computer keyboard;
- said platform surface being disposed sidewise below said row of keys;
- said plurality of keys on said housing including all the keys in a standard QWERTY keyboard;

[33] 7. The system in claim [31] 5 further comprising:

- said keyboard case having a row of keys near the top edge representing the Esc key, F1 to F12 keys, Print Screen key, Scroll Lock key and Pause key, said keyboard unit having on the left side all the keys representing the keys in a standard QWERTY keyboard, said keyboard unit having on the right side a numeric key pad representing the numeric key pad keys in a standard personal computer keyboard;

- said platform surface being disposed sidewise between the QWERTY keys and numeric key pad;
- said plurality of keys on said housing including the Up Arrow, Down Arrow, Left Arrow, Right Arrow keys, Insert, Delete, Home, End, Page Up, Page Down keys, and 3 keys representing the mouse buttons 1, 2 and 3 in a conventional 3-button computer mouse.

[34] 8. The system in claim [31] 5 further comprising:

- said keyboard unit having a row of keys near the top edge representing the Esc key, F1 to F12 keys, Print Screen key, Scroll Lock key and Pause key, said keyboard unit having all the keys representing the keys in a standard QWERTY keyboard, said keyboard unit having the cursor movement keys including the Up Arrow, Down Arrow, Left Arrow, Right Arrow keys, Insert, Delete, Home, End, Page Up, Page Down keys, said keyboard unit having a numeric key pad on the right side representing the numeric key pad keys in a standard personal computer keyboard, said cursor movement keys being disposed between the QWERTY keys and the numeric key pad;
- said platform surface being disposed sidewise between the QWERTY keys and numeric key pad;
- said plurality of keys on said housing including 3 keys representing the mouse buttons 1, 2 and 3 in a conventional 3-button computer mouse, said housing being located sidewise below said cursor movement keys.

[35] 9. The system in claim [31] 5 further comprising:

- said keyboard case having a row of keys near the top edge representing the Esc key, F1 to F12 keys, Print Screen key, Scroll Lock key and Pause key, said keyboard case having on the left side all the keys representing the keys in a standard QWERTY keyboard, said keyboard case having on the right side of said QWERTY keyboard keys the cursor movement keys including the Up Arrow, Down Arrow, Left Arrow, Right Arrow keys, Insert, Delete, Home, End, Page Up, Page Down keys;
- said platform surface being disposed sidewise on the left or right end of the keyboard case;

- said plurality of keys on said housing including all the numeric keys representing the numeric key pad keys in a standard personal computer keyboard.

[36] 10. The system in claim [30] 4 further comprising:

- a base being a keyboard case having a plurality of keys representing all the keys in a standard QWERTY keyboard;
- said housing having a plurality of keys including the Up Arrow, Down Arrow, Left Arrow, Right Arrow keys, Insert, Delete, Home, End, Page Up, Page Down keys, and 3 keys representing the mouse buttons 1, 2 and 3 in a conventional 3-button computer mouse, and the numeric key pad keys representing the numeric key pad in a conventional personal computer keyboard;
- said housing having on the left side an elongated indented area;
- a link member being a tubular structure having one end secured at the right side of said keyboard case and a second end extended into said housing through said elongated indented area on the left side of said housing, whereas said second end of said link member movable in a first direction along the length of said elongated indented area and a second direction along the depth of said elongated indented area, thereby said housing being disposed sidewise on the right side of said keyboard case and movable in said first and second directions relative to said keyboard case;
- said link member being hollow thereby said communication means passing through therein from said housing to said keyboard unit.

[61] 11. The system in claim [30] 4 further comprising:

- said housing being semi-circular shape of a footprint adapted by the thumb of an operator having one side with a first elongated indented area, said housing further including a total of 7 buttons, said buttons consisting 3 buttons being disposed near the straight edge of the semi-circular boundary, and a U-shaped button being disposed near the circular edge of the semi-circular boundary, and a composite button being disposed near the center compositing 3 buttons;
- a base being a keyboard case and a platform surface with a second elongated indented area;

- said communication means including a first communication member having one end received into said first housing through said first indented area and another end received into said supporting base through said second indented area thereby said first indented area facing said second indented forming a cavity allowing said first communication member to move thereon when said first housing moves over said platform surface;
- a link member being a tubular structure having a first end extended into said first indented area on said housing thereby said first end movable in a first direction along the length of said first indented area, said tubular structure having a second end extended into said second indented area on said platform surface thereby said second end movable in a second direction along the length of said second indented area, thereby said housing movable in said first and second directions coplanar to said platform surface, said first and second directions being orthogonal, said tubular structure being hollow thereby said communication means passing through therein from said housing into said base.

[37] 12. Method and apparatus of a position encoder system for a computer, comprising:

- a first member movably in a first direction relative to a reference base;
- a second member movably in a second direction relative a reference base, said second member movable in said first direction causing said first member moving in said first direction relative to a reference base;
- encoding means for sensing movements of said first member relative to the reference base, and movements of said second member relative to the reference base, thereby providing indicative signals to a host computer positional and directional information of said first and second members;
- communication means for transferring signals from said encoding means to a host computer;
- modification means for changing the functions the host computer performs base on the movements of said first and second members, including but not limit to changing the host computer to do nothing base on the movements of said first and second members;

- said first and second directions together covering a region in the Cartesian plane.

[38] 13. The system in claim [37] 12 wherein said second member movably in said second direction mounted on said first member.

[39] 14. The system in claim [38] 13 wherein:

- said first member having one side with a first indented area;
- said second member being movably engaged in said first indented area on said first member thereby said second member movable in said second direction along the length of said indented area of said first member.

[40] 15. The system in claim [39] 14 wherein said second member includes a first button liftable upwardly being sensed by a sensor thereby triggering said modification means changing the functions performed by a host computer base on the movements of said first and second members, said button being pressed serving as the same function as pressing the button 1 of a conventional computer mouse, said first button being able to rotate clockwise and anti-clockwise serving as the same function as rotating the scroll button in a conventional computer scroll mouse.

[41] 16. The system in claim [40] 15 further comprising:

- a base with an second indented area;
- said first member being movably engaged in said second indented area of said base thereby said first member movable in said first direction along the length of said second indented area of said base.

[42] 17. The system in claim [41] 16 wherein said second indented area on said base being a first elongated indented area and said first member having an protrusion movably mounted on said first elongated indented area thereby said first member movable along the length of said first elongated indented area.

[43] 18. The system in claim [41] 16 wherein said second indented area on said base being a rectangular indented area and said first member movably mounted on said rectangular indented area thereby said first member movable in the direction along the length of said rectangular indented area.

[44] 19. The system in claim [43] 18 wherein:

- said first member having a flat surface movably disposed under said rectangular indented area, said flat surface having a length of about twice the length of said rectangular indented area thereby said flat surface being remained covering said rectangular indented area when said flat surface being moved a distance about the length of said rectangular indented area along the length of said rectangular indented area;
- said elongated area on said first member being disposed near the middle of the length of said flat surface, thereby said elongated area on said first member being always within said rectangular indented area when said first member being moved.

[45] 20. The system in claim [43] 18 wherein:

- said first member being an elongated tubular structure having one end movably engaged on one side of said rectangular indented area and another end movably engaged on the opposite side of said rectangular indented area thereby said elongated tubular structure movable within said rectangular indented area along the direction of the sides of said rectangular indented area being engaged;
- said elongated indented area on said first member being disposed along the side of said first member facing behind an operator thereby hidden from the operator during normal operation of the position encoder system.

[46] 21. The system in claim [45] 20 wherein said rectangular indented area having 2 walls depressed inwardly into said base on 2 opposite sides of said rectangular indented area, an elongated indented area being positioned on each of said 2 walls, said first member having one end with a protrusion movably engaged on said elongated indented area of one of said 2 walls and another end with a protrusion movably engaged on said elongated indented area of the other of said 2 walls.

[47] 22. The system in claim [46] 21 wherein said communication means including connection means such as electricity wires passing through said indented area on said first member and said indented area on said base.

[48] 23. The system in claim [40] 15 wherein said second member further includes a second and third buttons serving as the same function as the button 1 and 2 in a conventional 3-buttons computer mouse.

[49] 24. The system in claim [40] 15 wherein said first button being able to rotate to point at 3 different positions thereby pressing said first button generating indicative signals for the position pointing by said first button to a host computer to perform different functions based on the position pointing by said first button, said 3 different positions including but not limited to serving as corresponding to the 3 buttons of a conventional 3-buttons computer mouse, thereby rotating said first button pointing to the first position of said 3 different positions and pressing said first button serving as pressing button 1 of a conventional 3-button computer mouse, rotating said first button pointing to the second position of said 3 different positions and pressing said first button serving as pressing button 2 of a conventional 3-button computer mouse, rotating said first button pointing to the third position of said 3 different positions and pressing said first button serving as pressing button 3 of a conventional 3-button computer mouse.

[62] 25. The system in claim [46] 21 wherein said base being a hand-held computer device having a plurality of keys alongside with said rectangular indented area.

[50] 26. Method and apparatus of a position encoder, comprising:

- a first housing having a first plurality of keys movable in 2 directions over a reference base;
- a second housing having a second plurality of keys movable in 2 directions over a reference base;
- a first encoder means for sensing movement of said first housing thereby providing indicative information to a host computer of directional and positional information of said first housing;
- a second encoder means for sensing movement of said second housing thereby providing indicative information to a host computer of directional and positional information of said second housing;
- communication means for transferring signals from said first and second encoding means to the host computer;
- modification means for changing the function the host computer performs base on the movements of said first and second housings, said functions performed by the host

computer including but not limited to do nothing base on the movement of said first and second housings.

[51] 27. The system in claim [50] 26 further comprising:

- said first plurality of keys being operated by one hand of the operator, said first plurality of keys being pressed thereby generating character signals to a host computer, said first housing being moved by touching and/or pressing said first plurality of keys with the fingers of the operator and applying a lateral force;
- said second plurality of keys being operated by the other hand of the operator, said second plurality of keys being pressed thereby generating character signals to a host computer, said second housing being moved by touching and/or pressing said second plurality of keys with the fingers of the operator and applying a lateral force;
- a first sensing means detecting if any of said first plurality of keys being touched by the fingers of the operator thereby providing indicative signals to a host computer tactile information of said first plurality of keys;
- a second sensing means detecting if any of said second plurality of keys being touched by the fingers of the operator thereby providing indicative signals to a host computer tactile information of said second plurality of keys;
- said first and second plurality of keys being touched and/or pressed together with said first and second housings being moved or let motionless providing indicative signals to a host computer tactile information of said first and second plurality of keys and positional and directional information of said first and second housings, thereby directing a host computer to perform predetermined functions base on combinations of said first and second plurality of keys being touched and/or pressed together with said first and second housing being moving or not, allowing an operator to quickly direct a host computer to perform predetermined functions by changing hand gestures of touching and/or pressing said first and second plurality of keys and with or without applying a lateral force to move said first and second housings;
- said first and second housing being simultaneously operated by both hands of an operator wherein one hand pressing and/or touching said first plurality of keys together

with or without moving said first housing and the other hand pressing and/or touching said second plurality of keys together with or without moving said second housing, thereby directing a host computer to simultaneously perform 2 predetermined functions;

- said combinations of said first and second plurality of keys being touched and/or pressed together with said first and second housing being moving or not, including but not limited to none of said first and second plurality of keys are pressed nor touched;
- said combinations of said first and second plurality of keys being touched and/or pressed together with said first and second housing being moving or not, being configurable by an operator through software or hardware means, thereby an operator being able to define combinations of said first and second plurality of keys being touched and/or pressed together with said first and second housing being moving or not, to indicate to a host computer to perform different operations;
- said predetermined functions performed by a host computer being configurable by user through software or hardware means;
- said predetermined functions performed by a host computer including but not limited to deactivating said first and/or second encoding means thereby said first and/or second housings being moving but not directing a host computer to perform any function;
- said modification means being defined by some of said combinations of said first and second plurality of keys being touched and/or pressed together with said first and second housing being moving or not;
- an optional arm support being disposed sidewise in front of said first and second housing having a depth similar to the length of the forearm of the operator, thereby the entire forearm of an operator being able to rest on said support surface of said arm support under normal operation of said first and second housings, said arm support having the edge near said first and second housings being of height similar to the first row of keys on said first and second housings whereas the hands of an operator being

able to hang over said first and second housings thereby easier to apply lateral forces when the hands resting on said supporting surface of said arm support.

[52] 28. The system in claim [51] 27 further comprising:

- said first and second plurality of keys being touched and/or pressed when said first and second housings being let motionless being defined as emulated keys named by the keys being touched and/or pressed;
- said first and second plurality of keys being touched and/or pressed when said first and/or second housings being moving being defined as emulated mice named by the keys being touched and/or pressed.

[53] 29. The system in claim [51] 27 further comprising:

- a first group of combinations of said first and second plurality of keys being touched and/or pressed together with said first and/or second housing being moving or not, being directed to control operations of a first mouse pointer and operations associated with said first mouse pointer on a computer screen for a host computer;
- a second group of combinations of said first and second plurality of keys being touched and/or pressed together with said first and/or second housing being moving or not, being directed to control a second mouse pointer and operations associated with said second mouse pointer on a computer screen for a host computer.

[54] 30. The system in claim [51] 27 further comprising:

- said first housing having a first plurality of keys representing one half of the keys in the standard QWERTY keyboard;
- said second housing having a second plurality of keys representing the other half of the keys in the standard QWERTY keyboard whereas said first and second plurality of keys together forming the complete set of the keys in the stand QWERTY keyboard, said first and second plurality of keys being divided among the standard QWERTY keyboard between the key positions of the 5 and 6 keys, T and Y keys, G and H keys, V and B keys, the space key being split and appearing on both said first and second housings.

[55] 31. The system in claim [54] 30 further comprising:

- said second housing further including the Up, Down, Left and Right Arrow keys located below the Enter key, and the Pause, Insert, Delete, Page Up and Page Down keys located along the left edge of said second housing and on the right side of the Enter key;
- said second housing having an elongated opening on the right side;
- a link member having a first end being pivotally mounted at the left side of said first housing thereby said first housing foldable by rotating upwardly about said first end of said link member, said link member having a second end extended into said second housing through said elongated opening on the right side and being slidably engaging on a rail structure mounted inside said second housing, said second end of said link member being slidably mounted on a first tubular structure of said rail structure, thereby said second end of said link member movable in a first direction along the length of said first tubular structure, said first tubular structure having both ends slidably mounted on 2 other parallel tubular structures of said rail structure thereby said first tubular structure movable in a second direction along the length of said parallel tubular structures, said first direction being orthogonal to said second direction, said first tubular structure having both ends rotatable thereby said housing foldable when said second end of said link member moves to near said elongated opening of said housing, thereby said base and said housing foldable upwardly and facing each other and able to stand on a surface supporting by right edge of said first housing, said link member and the left edge of said second housing;
- said encoding means detecting movement of said second housing relative to said link member;
- said communication means including electrical wires passing through the body of said link member from said second housing into said first housing.

[56] 32. The system in claim [54] 30 further comprising:

- a base having a platform surface thereon said first and second housing moves;
- said first housing having a bottom side with an first indented area;
- said platform surface having a second indented area;

- a first link member having one end received into said first housing through said first indented area and another end received into said base through said second indented area thereby said first indented area facing said second indented forming a passage allowing said first link member to move therein when said first housing moves on said platform surface;
- said second housing having a bottom side with an third indented area;
- said platform surface having a forth indented area;
- a second link member having one end received into said second housing through said third indented area and another end received into said base through said forth indented area thereby said third indented area facing said forth indented forming a passage allowing said second link member to move therein when said second housing moves on said platform surface;
- said communication means including communication members passing through said first and second link members from said first and second housings into said base.

[57] 33. The system in claim [56] 32 wherein:

- said base further includes a row of keys near the top edge of the base, said row of keys representing the Esc key, F1 to F12 keys, Print Screen key, Scroll Lock key and Pause key, said platform surface being disposed sidewise below said row of keys;
- said base having 2 spring controlled protrusions, a depressed area of same size of one of said spring controlled protrusion being disposed on the bottom surface of said first housing, another depressed area of same size of the other of said spring controlled protrusions being disposed on the bottom surface of said second housing, said spring controlled protrusions being depressed to the same level of said platform surface during normal movement of said first and second housings, said spring controlled protrusions being released thereby plugging into said depressed areas on the bottoms of said first and second housings and locking said first and second housings in place when said first and second housings move so that said depressed areas move to above said spring controlled protrusions.

[58] 34. The system in claim [57] 33 wherein both said first and second housings having a protrusion under the bottom near the front edge thereby said protrusion supporting said first and second housing when said first and second housing moves laterally away from said platform surface.

[59] 35. The system in claim [56] 32 wherein said base being a notebook computer having a chassis for supporting said first and second housings, said platform surface being indented at a depth of about the height of said first and second housings, said platform surface being open at the left and right sides thereby said first housing movable laterally beyond the left boundary of said platform surface and said second housing movable laterally beyond the right boundary of said platform surface, said notebook computer having a cover pivotally mounted at said chassis, said cover having a left and right edges with sloped protrusions, said first housing having left boundary with a sloped edge and said second housing having right boundary with a sloped edge, whereas said cover folding downward to said chassis causing said first and second housings moving laterally to the centre of said platform surface by mechanical or electronic means, said cover folding further downward causing said left sloped protrusion touching said left sloped edge and said right sloped protrusion touching said right sloped edge, thereby forcing said first and second housings to glide in place when said cover completely collapsed.

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